

Correlation between Physician Charges and Outcome for Coronary Artery Bypass Grafting: Does Quality Matter?

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Step 1: Specify the measure you have implemented

The association between 30-day risk adjusted mortality after single vessel coronary artery bypass grafting (CABG) and surgeon charges.

Step 2: Background to your organisation

In the United States, there is wide variation in charges submitted by providers to private health plans. In an effort to contain costs, price transparency tools have emerged in the marketplace. A fundamental purpose of these tools is to report not only the costs of specific providers but also their quality. However, provider-level data on quality is far less common than data on charges, in part because quality is difficult to measure. An important question for these tools, and price transparency efforts more generally, is whether physicians who charge more provide higher, lower, or the same quality medical care. In 2012, the Centers for Medicare and Medicaid Services (CMS) released charge amounts by physicians for procedures and services. Although these charged amounts typically exceed the prices paid by CMS and private health plans, they reflect the prices charged to individuals without insurance and possibly those in high deductible health plans. In an effort to study whether higher charging providers deliver better, worse, or the same patient outcomes, we compared these provider-level charge data with publicly available data on risk-adjusted mortality rates for surgeons performing coronary artery bypass grafting (CABG) in three US states (New York, California, Massachusetts).

Step 3: Record what is already known about this outcome measure

There is limited data available comparing the charge or actual cost of care to either medical or surgical outcomes. Neither charge nor cost is transparent and often privileged information between providers and payers. The lack of price transparency as well as the limited amount of publically available information on outcomes hinders any analysis of an association between these measures.

Step 4: Numerator

The risk adjusted mortality rate (RAMR) for coronary artery bypass grafting was obtained for each surgeon from publically reported databases for each state.

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Step 5: Denominator

In 2012, 236 physicians from California, New York, and Massachusetts had charge data reported by CMS as well as RAMRs for CABG (*figure 1 & figure 2*)

Figure 1: Distribution of Physician Charges by State (Total number vs. Charges) A. All B. California C. Massachusetts D. New York

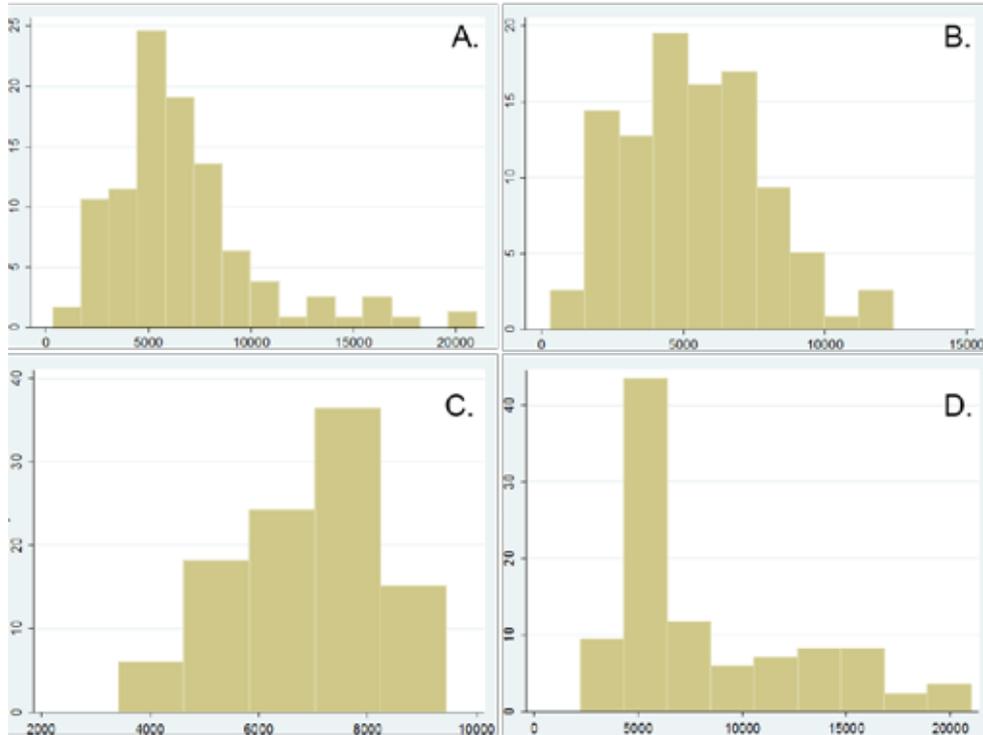
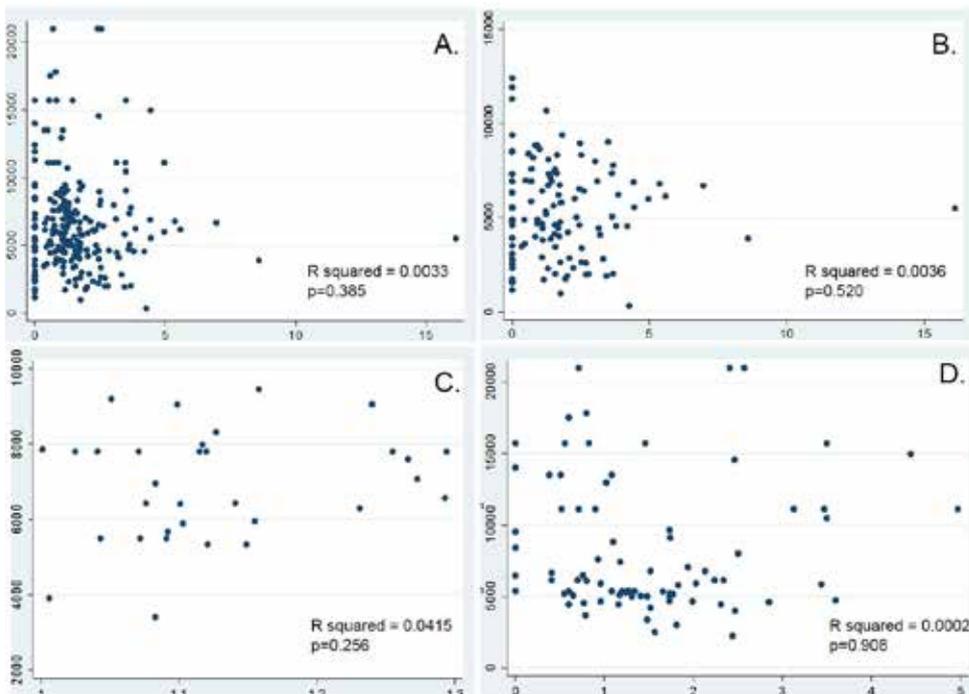


Figure 2: Relationship between RAMR and Charge by State (Charge vs. RAMR) A. All B. California C. Massachusetts D. New York



Step 6: Main Outcome Variable

Provider charge for a one-vessel arterial coronary artery bypass graft (CABG-1vza: Current Procedural Terminology (CPT 33533) as reported in the CMS dataset and risk adjusted mortality rate (RAMR) for coronary artery bypass grafting.

Step 7: Main Predictor Variable

Physician-level risk adjusted 30-day mortality rate for CABG overall (1 or more vessels bypassed). Risk adjustment varied per individual state and mortality was adjusted per multivariate predictors of mortality identified by each state. (CABG C, Reporting O, Program CCABGMR. [cited 2015 May];

Available from:

http://www.oshpd.ca.gov/HID/Products/Clinical_data/CABG/2011/CABG2011.pdf; Center MDA, Policy DoHC, School HM. [cited 2015 May];

Available from:

<http://www.massdac.org/wp-content/uploads/CABG-FY2012-Update.pdf>; Health NYSDo. [cited 2015 May];

Available from:

https://www.health.ny.gov/statistics/diseases/cardiovascular/heart_disease/docs/2009-2011_adult_cardiac_surgery.pdf.)

Step 8: Results

We found no correlation between submitted charges and RAMR at the provider level ($R^2=0.003$, $p=0.39$). Household median income ($R^2=0.05$, $p=0.005$), physician density ($R^2=2.0$, $p=0.03$), and New York state ($R^2=2218.0$, $p=0.001$) were associated with charge. Among surgeons performing CABG in three states, there was no correlation between provider-level charges and 30-day adjusted mortality.

Step 9: Implementation of the outcome

In an effort to study whether higher charging providers deliver better, worse, or the same patient outcomes, we performed a cross-sectional study to determine whether 30-day risk adjusted mortality after single vessel CABG was associated with surgeon charges. Charge data was obtained from the Centers for Medicare and Medicaid Services (CMS) which publicly reported charge amounts by physicians for procedures and services in 2012.(Services CfMaM. [cited 2014 October];

Available from:

<http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Provider-Charge-Data/Downloads/Medicare-Physician-and-Other-Supplier-PUF-Methodology.pdf>; Services CoMaM. [cited 2014 October]; Available from: <http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Provider-Charge-Data/Physician-and-Other-Supplier.html>.)

Although these charged amounts typically exceed the prices paid by CMS and private health plans, they reflect the prices charged to individuals without insurance and possibly those in high deductible health plans. The provider charge for a one-vessel arterial coronary artery bypass graft (CABG-1vza: Current Procedural Terminology (CPT 33533) was selected to as a representative charge as it is consistently reported to code for the widely used internal mammary artery graft. A CABG-1vza also has a higher relative value unit (RVU) designation than venous grafting. We matched this data at the provider-level to publicly-reported data on risk-adjusted 30 day mortality after CABG for surgeons in California (2009-2010), Massachusetts (2005-2008), and New York (2008-2010). (Health NYSDo. [cited 2014 October];

Available from:

http://www.health.ny.gov/diseases/cardiovascular/heart_disease/index.htm; Mass-DAC. [cited 2014 October]; Available from: www.massdac.org; Program CCABGMR. [cited 2014 October]; Available from: www.pbgh.org/storage/documents/reports/CABG_FullReport.pdf.)

Pennsylvania publicly reports 30-day mortality rates for surgeons but we did not include this state because these rates are not risk-adjusted. (Council PHCCC. [cited 2014 October]; Available from: www.phc4.org/reports/cabg/12/nr110613.htm.) Physician medical school, residency, and fellowship information were obtained from healthgrades.com and health.usnews.com. (health.usnews. [cited 2014 October];

Available from:

<http://health.usnews.com/top-doctors/articles/2013/07/08/about-us-news-doctor-finder?int=187fef>); healthgrades. [cited 2014 October]; Available from: <https://d2dcgio3q2u5fb.cloudfront.net/b5/ef/c0ba84604770af2704015dc67bf8/healthgrades-provider-search-methodology.pdf>.)

County codes (derived from practice zip codes) were linked to the Area Resource File (ARF), which is a county-level database maintained by the U.S. Department of Health and Human Services' Health Resources and Services Administration that contains data on health resources including physician supply and general population census data. (Health Resources and Services Administration. Area Health Resources Files (AHRF) Overview.

Available at

<http://ahrf.hrsa.gov/overview.htm>. Accessed October 27, 2014.)

We performed physician-level analyses. We first reported the mean charge for a CABG-1vza for individual providers. We then used ordinary least squares regression to estimate the linear relationship between a provider's mean charge and risk-adjusted thirty-day mortality rates (RAMR). To test for independent associations between risk-adjusted mortality rates and charges we used multivariable linear regression with mean provider charge as the independent variable and risk-adjusted mortality rate as the predictor variable. Additional independent variables included physician characteristics (i.e. age, sex, attendance at a top ten medical school, residency, or fellowship, and practice at an academic medical center) and the county characteristics (i.e. household median income, population size, urban versus rural location, physicians per 100,000 residents, and percent of population that is white). Analyses were performed using Stata Statistical Software, version 13.0 (StataCorp). We considered a p-value of <0.05 to be statistically significant.

Step 10: Changes made to improve this outcome

Our analysis was limited to procedures with reportable outcomes and states that report them. Provider charges are also not what payers reimburse providers. Provider payments by commercial payers are confidential, therefore our data does not have the actual reimbursed amount for care provided. These rates are unknown and may substantially differ from charge price. Our findings are particularly relevant to patients who are likely to face the full provider charges associated with medical care since we show that higher charges for CABG do not correlate with the quality outcome of mortality. The use of price transparency tools along with the reporting of outcomes for common medical and surgical conditions (i.e., quality transparency) can be a powerful tool to improve both quality and improve access to care by reducing cost.

Step 11: Related outcomes

Charge and risk-adjusted mortality rate is related to other outcome measures including actual cost as well as other standard measures such as risk-adjusted morbidity and length of stay as well as patient centric measures such as quality of life after procedure, pain, and return to work. (i.e., quality transparency) can be a powerful tool to improve both quality and improve access to care by reducing cost.

Step 12: Ratings

Please rate 1-5 (1 being the lowest and 5 being the highest) for the following measures of your outcome:

Ease of implementation (1, 2, 3, 4, 5): **5**

Ease of data collection (1, 2, 3, 4, 5): **4**

Sustainability of outcome (1, 2, 3, 4, 5): **4**

Evidence base for outcome (1, 2, 3, 4, 5): **3**

Reliability of outcome (1, 2, 3, 4, 5): **4**

Figure Legends:

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Figure 2: Relationship between RAMR and Charge by State (Charge vs. RAMR) A. All B. California C. Massachusetts D. New York

References:

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Center MDA, Policy DoHC, School HM. [cited 2015 May]; Available from: <http://www.massdac.org/wp-content/uploads/CABG-FY2012-Update.pdf>.

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Services CfMaM. [cited 2014 October]; Available from: <http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Provider-Charge-Data/Downloads/Medicare-Physician-and-Other-Supplier-PUF-Methodology.pdf>.

Services CoMaM. [cited 2014 October]; Available from: <http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Provider-Charge-Data/Physician-and-Other-Supplier.html>.

Health NYSDo. [cited 2014 October]; Available from: http://www.health.ny.gov/diseases/cardiovascular/heart_disease/index.htm.

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health.usnews. [cited 2014 October]; Available from: <http://health.usnews.com/top-doctors/articles/2013/07/08/about-us-news-doctor-finder?int=187fef>.

healthgrades. [cited 2014 October]; Available from: <https://d2dcgio3q2u5fb.cloudfront.net/b5/ef/c0ba84604770af2704015dc67bf8/healthgrades-provider-search-methodology.pdf>.

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